

## Composite Structure Monitoring using Direct Write Sensors, Phase I

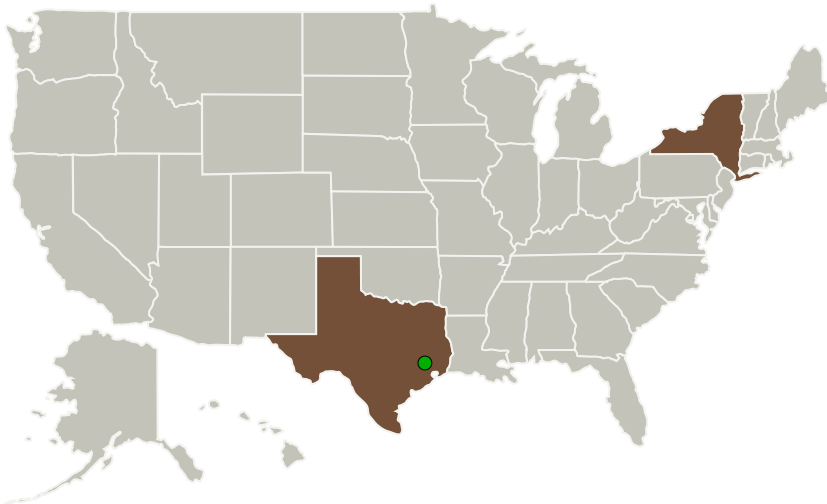
Completed Technology Project (2010 - 2010)



## Project Introduction

Direct Write (DW) sensors deposited directly and precisely on to complex (3D) components are proposed. Sensors proposed include strain gages and thermocouples, intended as diagnostic elements of a larger health management (HM) scheme. The sensors are deposited using a high precision derivative of thermal spray, affording them the advantages of high temperature tolerance and compatibility with coatings. Strain gages will be deposited as patches onto a range of composites, and laser micromachined to produce their characteristic resistive elements. Signal routing may be via microwelding or DW lead-lines. Thermocouples will be deposited as conformal, parallel traces of paired thermoelements, overlapping to form a junction at the location whose temperature is to be measured. The sensors, having been deposited onto substrates representative of structures on upcoming NASA space vehicles (Orion, Ares, Altair), will then be exposed to conditions similar to those anticipated for said structures, such as low temperatures for fuel tanks, biaxial stress for other pressure vessels, and thermal cycling for on-orbit and lunar exposure. The sensors, having demonstrated their diagnostic capability and compatibility with existing DAQ and HM infrastructures, would form the cornerstone of a potential Phase II continuing application-specific sensor development while expanding to tackle HM integration issues.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
MesoScribe Technologies, Inc.	Lead Organization	Industry	Setauket, New York
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
New York	Texas

## Project Transitions

▶ **January 2010:** Project Start

✓ **July 2010:** Closed out

**Closeout Documentation:**

- Final Summary Chart(<https://techport.nasa.gov/file/140100>)

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

MesoScribe Technologies, Inc.

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

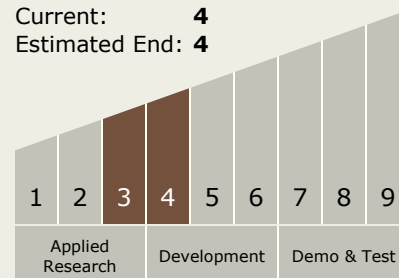
Carlos Torrez

**Principal Investigator:**

William C Smith

## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



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## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.2 Observatories
    - └ TX08.2.2 Structures and Antennas

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System